

# Quadratic Unit Review

Name

King

1. Write the Quadratic formula.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

2. Write the formula for the axis of symmetry

$$x = \frac{-b}{2a}$$

3. Write the formula for the discriminant.

$$b^2 - 4ac$$

Solve by completing the square.

4.  $d^2 + 3d - 10 = 0$

(2.25)

$$(d + 1.5)^2 = \sqrt{12.25}$$

$$d = -1.5 + 3.5 = 2$$

$$-1.5 - 3.5 = -5$$

$$-5 \text{ \& } 2$$

5.  $s^2 - 10s = 23$

(5)

$$s - 5 = \sqrt{40}$$

$$s = 5 + 6.9$$

$$s = 5 - 6.9$$

$$-1.9 \text{ \& } 11.9$$

Solve the equation by using the quadratic formula.

6.  $5x^2 + 10x - 7 = 0$

$$-2.5 \text{ \& } .5$$

7.  $4p^2 + 4p = 15$

$$-2.5 \text{ \& } 1.5$$

$$4p^2 + 4p - 15 = 0$$

To prepare for the Quadratics test:

Review and study sections 10-1, 10-2, 10-3, 10-4, and vertical motion problems.

Know the formulas above.

Distance formulas for the vertical motion problems will be given on the test.

Review

Graphing quadratics:

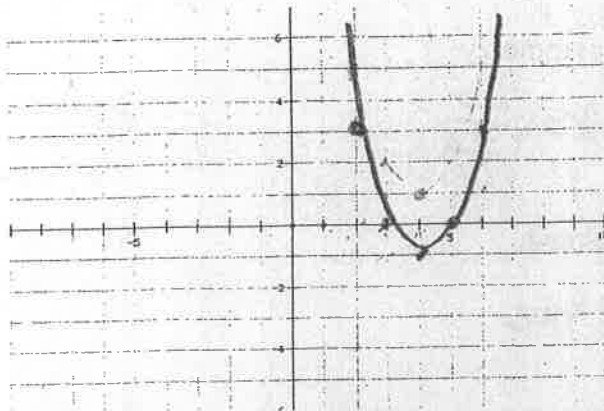
Find the x- intercepts, vertex, make a table of values and graph:

6.  $x^2 - 8x + 15 = 0$

x intercepts 5, 3 Vertex (4, -1)  $16 - 32 + 15 = -1$

$-\frac{b}{2a} = -\frac{8}{2} = 4$

Line of symmetry 4 pattern 1, 3, 5

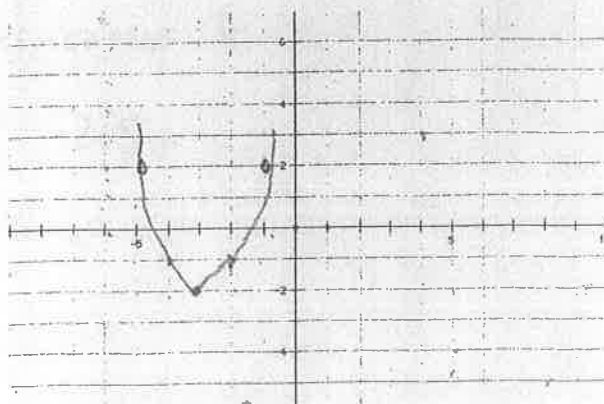


7.  $x^2 + 6x + 7 = 0$

x intercepts  Vertex (-3, -2)  $9 + -18 + 7 = -2$

$-\frac{b}{2a} = -\frac{6}{2} = -3$

Line of symmetry -3 pattern 1, 3, 5



between  
-1 and -2  
-4 and -5

$$d = rt - 5t^2$$

A soccer player kicks the ball giving it an initial upward velocity of 17 meters/second.

a.) How high will the ball be after 1.2 seconds?

$$d = 17(1.2) - 5(1.2)^2$$

$$= 13.2 \text{ m}$$

b.) When will it be 10 meter above the ground?

$$10 = 17t - 5t^2$$

$$-5t^2 + 17t - 10 = 0$$

$$-17 \pm \sqrt{17^2 - 4(-5)(-10)}$$

$$\frac{2(-5)}{2(-5)}$$

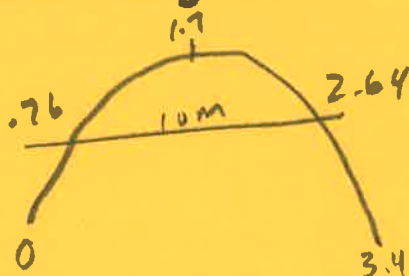
$$.76 \text{ and } 2.64$$

c.) When will it be back down on the ground?

$$-5t + 17t = 0$$

$$0 \text{ or } 3.4 \rightarrow$$

$$0 \text{ and } 3.4$$



$$\frac{2.64}{3.4}$$

$$\frac{3.4}{2} = 1.7$$

d.) What is the highest altitude the ball will reach?

$$d = rt - 5t^2$$

$$d = 17(1.7) - 5(1.7)^2$$

$$d = 14.45 \text{ meters}$$

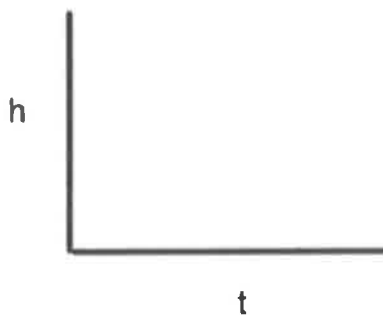
For these problems you will use the following formulas:

$$h = -16t^2 + vt + s \quad \text{English Standard System} \quad \text{and} \quad d = -5t^2 + rt \quad \text{Metric System}$$

### Bottle Rocket Problem:

A bottle rocket is shot into the air with an upward velocity of 80ft./sec. from an initial height of 6 feet.

Sketch a graph and label it with the following:



$$-16t^2 + 80t + 6 = 0$$

a. When will the rocket reach the maximum height?

$$\frac{-b}{2a} = \frac{-80}{2(-16)} = \frac{-80}{-32} = 2.5$$

b. What is the maximum height the bottle will reach?

$$-16(2.5)^2 + 80(2.5) + 6 = 106 \text{ feet}$$

c. How long will it take the rocket to reach the height it started at?

$$-16t^2 + 80t + 0 = 0 \quad 5 \text{ sec.}$$

d. How long will it take the rocket to reach the ground?

$$-16t^2 + 80t + 6 = -6 \quad -16t^2 + 80t + 6 + 6 = 0 \quad -16t^2 + 80t + 12 = 0$$

$$5.14 \text{ sec.}$$

## Golf Problem

A golf ball is hit high into the air with an initial upward velocity of 33 m/sec. (Sketch a graph to help visualize)

a. How high is the ball after 3 seconds?

$$-5(3)^2 + 33(3) = 54 \text{ meters}$$

a. When will the ball be 29 meters above the ground?

b.  $-5t^2 + 33t = 29$                        $-5t^2 + 33t - 29 = 0$

1.04 sec. & 5.56 sec.

c. Will the ball ever be 60 meters above the surface?

$-5t^2 + 33t = 60$                        $-5t^2 + 33t - 60 = 0$  No Real Roots - No

or

$$33^2 - 4(-5) - 60$$

$$\frac{-33}{2(-5)} = 3.3 \quad -5(3.3)^2 + 33(3.3) - 60 = -5.55$$

d. What is the maximum height the ball will reach?

e.  $\frac{-33}{2(-5)} = 3.3$      $-5(3.3)^2 + 33(3.3) + 0 = 54.45 \text{ m}$